During this period suggestions of a possible role of the Golgi apparatus in secretion were further developed. Researchers found that it absorbed a variety of dyes into droplets, giving rise to the idea, articulated by Kirkman and Severinghaus, that the Golgi apparatus serves as a condensation membrane:

> A great deal of work strongly suggests that the Golgi apparatus neither synthesizes secretory substances nor is transformed directly into them; but it acts as a condensation membrane for the concentration, into droplet or granules, of products elaborated elsewhere and diffused into the cytoplasm. These elaborated products may be lipoids, yolk, bile constituents, enzymes, hormones, or almost any other formed substance. (1938b, p. 85)

Others, however, argued that it was in fact the locus of synthesis – Bowen described it as "a great intracellular center of chemical synthesis or enzyme formation" (1924, p. 215). Bourne advocated the view that the surfaces of the Golgi apparatus were the key to their synthetic function.

Overall, by 1940 a consensus was developing that the Golgi apparatus was a true component of the cell, with most theorists proposing that it functioned in cell secretion.[22] These claims, however, were still open to challenge. In Chapter 4 I note a pair of 1949 papers in which Albert Claude and George Palade argued that the Golgi apparatus was indeed an artifact of staining. Eventually they accepted the existence of this structure and, as discussed in Chapter 6, Palade made major contributions to determining its function.

The State of Cytology circa 1940

By 1940, cytology had advanced about as far as it could with the resources of the light microscope. The accounts of the mechanism of cell division remained the major success story in pursuit of mechanisms responsible for cell functioning. Although several organelles had been identified in the cytoplasm, each remained controversial. The evidence was strongest for the reality of the mitochondrion and the Golgi apparatus, but dissenters remained who

[22] De Robertis, Nowinski, and Saez commented in their textbook, *General Cytology*, "Although the existence of a relationship between secretion and Golgi apparatus seems possible, the explanation of this relationship has not yet left the domain of hypothesis. If this is the present situation for the secretory cells, even more nebulous is the interpretation of the functional significance of the Golgi apparatus in the nonsecretory cells and particularly in the nerve cells, where it has such a considerable development. It has been thought that it may intervene in the secretion of fats, the elaboration of Nissle bodies, the metabolism of carbohydrates, and so on, but it is safer to affirm that up to the present time, there is no satisfactory theory to explain in a general form and for all cells the function of the Golgi apparatus" (1949, pp. 112–13; the same passage appears in the second edition, 1954, p. 147).